IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A current-in-plane (CIP) GMR sensor, comprising:

a GMR sensor stack having a width selected to provide a predetermined track width;

a spacer layer, having a width substantially equal to the spin valve stack, formed over a free-layer of the GMR sensor stack; ~~and~~

an in-stack biasing layer disposed over the spacer and having a width substantially equal to the width of the GMR sensor stack; and

an antiferromagnetic layer formed on both sides of the in-stack biasing layer to provide an off-track bias layer.

2. (Previously Presented) The CIP GMR sensor of claim 1, wherein the in-stack biasing layer comprises materials selected from the group consisting of NiFe, CoFe, NiFeCr, NiFeX and CoFeX.

3. (Canceled)

4. (Currently Amended) The CIP GMR sensor of claim [[3]] 1, further comprising lead layers formed on either side of the GMR sensor stack, wherein the lead layers comprises a layer of Rhodium disposed adjacent to the GMR sensor stack and a Tantalum layer formed over the layer of Rhodium.

5. (Currently Amended) The CIP GMR sensor of claim [[3]] 1, wherein the antiferromagnetic layer comprises a layer of Platinum-Manganese.

6. (Currently Amended) The CIP GMR sensor of claim [[3]] 1, wherein the in-stack biasing layer comprises a bias layer formed only over the spacer and a coupling layer formed over the bias layer and the antiferromagnetic layer.

7. (Previously Presented) The CIP GMR sensor of claim 6, wherein the bias layers and coupling layer each comprise a material selected from the group consisting of NiFe, CoFe, NiFeCr, NiFeX and CoFeX.

8. (Original) The CIP GMR sensor of claim 1 further comprising a cap layer formed over the in-stack bias layer.

9. (Currently Amended) A magnetic storage system, comprising:

a magnetic storage medium having a plurality of tracks for recording of data; and

a current-in-plane (CIP) GMR sensor maintained in a closely spaced position relative to the magnetic storage medium during relative motion between the magnetic transducer and the magnetic storage medium, the CIP GMR sensor further comprising:

a GMR sensor stack having a width selected to provide a predetermined track width;

a spacer layer, having a width substantially equal to the spin valve stack, formed over a free-layer of the GMR sensor stack; ~~and~~

an in-stack biasing layer disposed over the spacer and having a width substantially equal to the width of the GMR sensor stack; and

an antiferromagnetic layer formed on both sides of the in-stack biasing layer to provide an off-track bias layer.

10. (Previously Presented) The magnetic storage of claim 9, wherein the in-stack biasing layer comprises materials selected from the group consisting of NiFe, CoFe, NiFeCr, NiFeX and CoFeX.

11. (Canceled)

12. (Currently Amended) The magnetic storage of claim [[11]] 9, , further comprising lead layers formed on either side of the GMR sensor stack, wherein the lead layers comprises a layer of Rhodium disposed adjacent to the GMR sensor stack and a Tantalum layer formed over the layer of Rhodium.

13. (Currently Amended) The magnetic storage of claim [[11]] 9, wherein the antiferromagnetic layer comprises a layer of Platinum-Manganese.

14. (Currently Amended) The magnetic storage of claim [[11]] 9, wherein the in-stack biasing layer comprises a bias layer formed only over the spacer and a coupling layer formed over the bias layer and the antiferromagnetic layer.

15. (Currently Amended) The magnetic storage of claim [[9]] 14, wherein the bias layer and the coupling layer each comprise a material selected from the group consisting of NiFe, CoFe, NiFeCr, NiFeX and CoFeX.

16. (Original) The magnetic storage of claim 9 further comprising a cap layer formed over the in-stack bias layer.

17. (Currently Amended) A method for providing a current-in-plane (CIP) GMR sensor with an improved in-stack bias layer with a thinner sensor stack, comprising;

forming a thin spin valve stack having a width selected to provide a predetermined track width;

forming a spacer over the spin valve stack, the spacer having a width substantially equal to the spin valve stack;

forming lead layers in a passive region outside the track;

forming, over the spacer, an in-stack bias layer having a width substantially equal to the width of the GMR sensor stack for biasing a free-layer of the spin valve stack; ~~and~~

forming a cap over the bias layer; and

forming an antiferromagnetic layer on both sides of the in-stack biasing layer to provide an off-track bias layer.

18. (Previously Presented) The method of claim 17, wherein forming the lead layers further comprises forming a layer of Rhodium disposed adjacent to the GMR sensor stack and forming a Tantalum layer formed over the layer of Rhodium.

19. (Previously Presented) The method of claim 17, wherein the forming of the in-stack bias layer comprises forming a layer of Platinum-Manganese.

20. (Previously Presented) The method of claim 17, wherein the in-stack bias layer comprises a bias layer formed only over the spacer and a coupling layer formed over the bias layer and the antiferromagnetic layer.

21. (Currently Amended) The method of claim [[17]] 20, wherein the forming of the bias layer and the coupling layer each further comprises using a material selected from the group consisting of NiFe, CoFe, NiFeCr, NiFeX and CoFeX.